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Meaningful Personalization of Hybrid Virtual Museum Experiences Through Gifting and Appropriation

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DEM	Demonstrator, pilot, prototype	
DEC	Websites, patent filling, videos, etc.	
O	Other	
ETHICS	Ethics requirement	

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Abstract

The deliverable presents the outcomes of Task T6.3, the design on the Final Toolbox which is part of WP6, the Tools workpackage within the GIFT project. The ultimate goal is to “deliver a flexible and extensible box of tools to enable museums and their visitors to co-create, experience and share compelling virtual museum experiences”. The process of creating this toolbox is both iterative and evolutionary, involving close collaboration with other workpackages and also external partners so as to ensure that our tools are grounded in the requirements and contexts of real museums. The Toolbox itself comprises individual tools to support the design, implementation and analysis of museum experiences which are loosely knitted together through the use of a common metadata scheme and API to allow integration with a content management system.

Previous deliverables D6.1 and D6.2 reported the initial design and subsequent release of the Beta version of the GIFT Toolbox. This deliverable reports the further evolution in the Toolbox, presenting the designs of seven key tools:

- **Cardographer** – that supports the data-driven use of ideation cards during the design process;
- **Scannerbox**- that supports photogrammetry and the use of subsequent 3D models as assets;
- **Gift Wrapper** – that allows physical objects to be wrapped in digital media using a variety of IoT technologies;
- **Gift Maker** – that enables visitors to create and gift personalised museum visits to one another; and
- **Emotion Mapper** – that enables various forms of self-reporting of emotional responses to exhibits alongside data such as video that might be analysed to extract further clues as to emotional state.
- **One Minute Experience** – enables curators as well as non-professional writers to create engaging and easy-to-read interpretive texts for their objects.
- **Visitors’ Album** – enables visitors to share their thoughts and emotions about exhibits anonymously with each other.

The deliverable also reports updates to the underlying platform (Schema, API and CMS) that enables these tools to share data.

1. Introduction

We report the outcomes of Task T6.3, the design on the Final Toolbox which is part of WP6, the Tools workpackage within the GIFT project.

As a reminder and general orientation to the deliverable, the overall aim of WP6 is to “deliver a flexible and extensible box of tools to enable museums and their visitors to co-create, experience and share compelling virtual museum experiences”. Given the diversity of approaches to be explored by the project and in the interests of flexibility the overall approach is to create a toolbox of software components – apps, web plugins and servers – that can be easily and flexibly reconfigured as well as extended rather than producing a single monolithic platform. Ultimately, the public face of these tools will take the form of a suite of apps and web plugins that can be directly downloaded and used by visitors, complemented by an open source software repository that will enable developers and technical support staff to install demonstration services and refine and extend them where necessary.

Previous deliverables D6.1 and D6.2 reported the initial design and subsequent release of the Beta version of the GIFT Toolbox. They described an iterative and user-driven approach in which generalised Tools emerge from close engagement with other project workpackages, (especially WP2 and WP3 that directly engage in prototyping museum experiences) as well as through impact and dissemination activities carried out with external partners as shown in Figure 1.

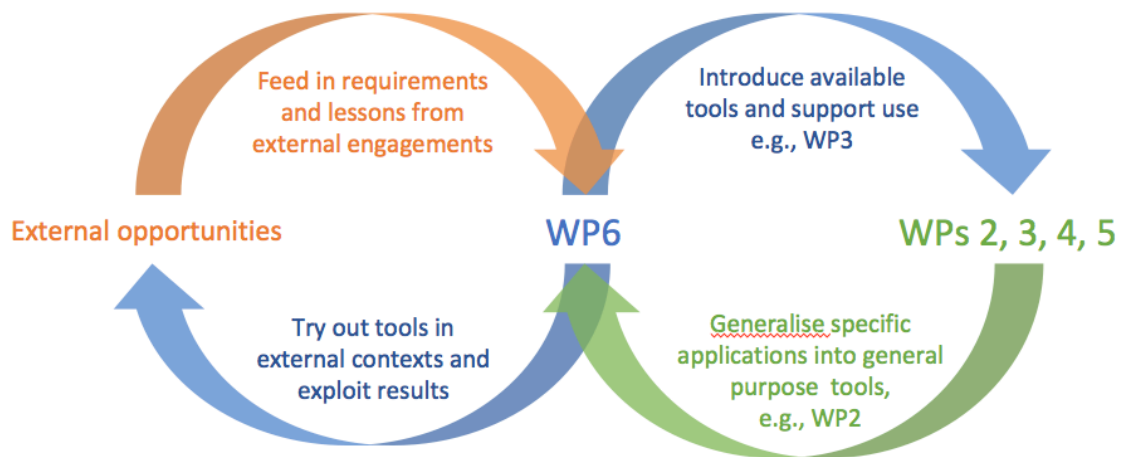


Figure 1. The iterative process of developing the GIFT Toolbox

This process has continued as we have headed into the second part of the project and the final design of the Toolbox. In what follows we report the final design of the toolbox, specifying its various individual tools and supporting platform that integrate them while also explaining where each has emerged from and how it has been tested and refined through practice. This practice-led approach to research means that generalised designs (and prototypes too) emerge from detailed practical explorations, rather than tools emerging from a top-down design process – an approach that we believe to be suitable for a research project that seeks to innovate new ideas. Consequently, we devote significant space in this deliverable to reporting the multiple practical explorations that have informed our Toolbox so that its design can be understood in the context of actual use.

The main deliverables from this work takes the form of an online repository of tools that can be found at: <https://toolkit.gifting.digital>. The work reported here has also contributed to three full papers being published at the ACM’s Computer Human Interaction (CHI) conference in 2018 [12] and 2019 [5] and [13] (all of which credit the Gift project).

2. Overview of the final toolbox

We begin with a high-level overview of the Toolbox. Figure 2 presents the first prototype design from D6.1 as presented at the project's first formal review and subsequently released in the Beta release of D6.2. At that point the Toolbox was seen as comprising three broad kinds of tools:

- Tools to support the Design of interactive museum experiences, exemplified by the Ideation cards tool.
- Tools to support their implementation, including a Gift exchange tool and Augmented reality Sharing tool
- Tools to support the evaluation of museum experiences, for example by visualising patterns of gift exchange among visitors.

These were supported by an underlying platform for sharing gift experiences which itself comprised:

- A metadata scheme for describing hybrid gifts.
- An application Programming Interface (API) for accessing them.
- A Content Management System (based on Wordpress in the current implementation) for managing and authoring them.

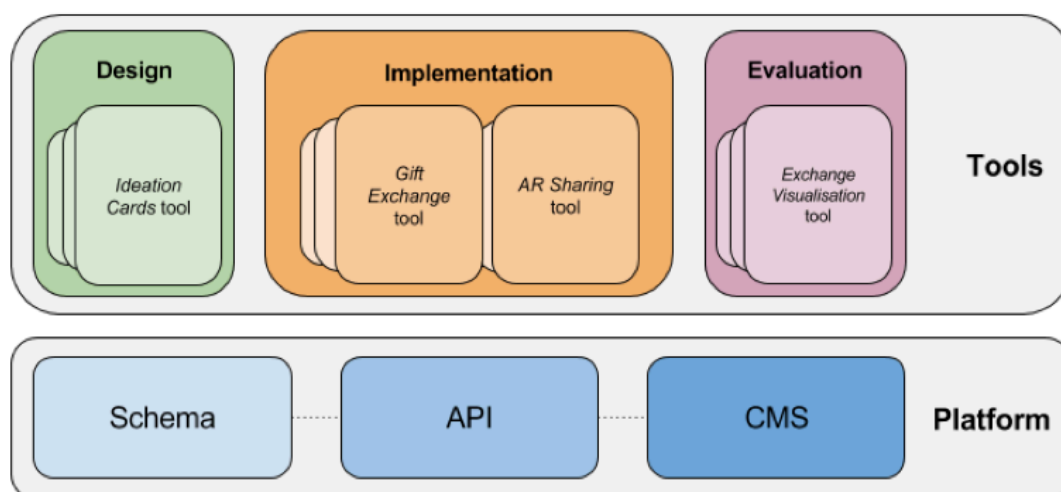


Figure 2. Design of the Beta Toolbox as previously reported in D6.1

The Toolbox has retained this overall structure into its second and final iteration, though the individual tools have changed their nature, with current tools being refined and new ones added, leading to the revised design shown in Figure 3.

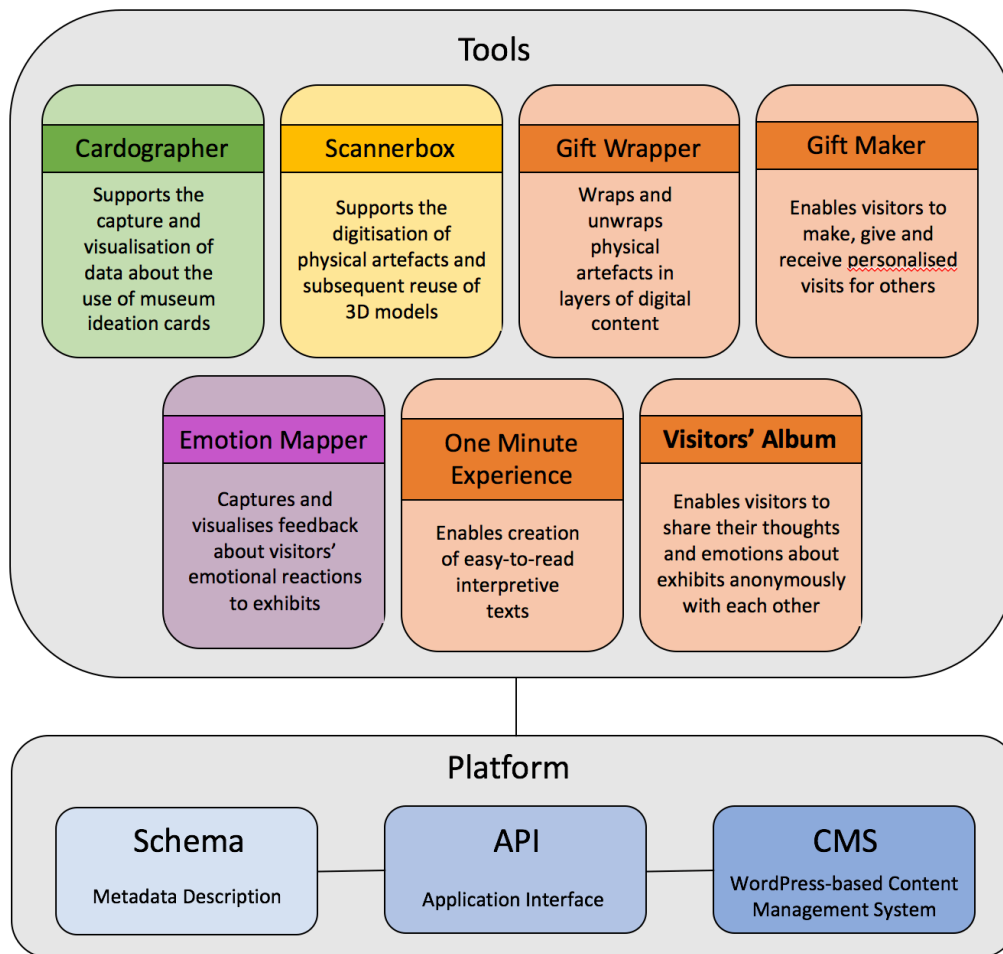


Figure 3. Revised design of the Final Toolbox (design tools in green, asset capture and generation in yellow, experience prototyping in orange, and evaluation in purple)

The revised tools in this second version are:

- **Cardographer:** an extended version of the previously proposed ideation cards tool that supports use of museum ideation cards by (i) helping the capture of data about which cards have been used in which designs (including using augmented reality to recognise cards on paper posters) and (ii) visualising the results to guide designers as to which cards appear more frequently and which are rarely used which might help shape their design thinking.
- **Scannerbox:** a light-weight photogrammetry tool-chain that supports museum professionals, and potentially visitors themselves, in digitising physical artefacts and so they can use the resulting 3D models as digital assets for making gift experiences. This is a new tool that was introduced into the project as a result of early experiences in WP3 as well as engagement with several external partners including the National Museum of Serbia, Tate Modern and City Arts.
- **Gift-wrapper:** an extended version of the previous AR Sharing tools that used Nottingham's Artcodes technology to connect digital media to physical objects via aesthetic scannable visual markers. The new tool supports (i) multiple forms of physical-digital connection and (ii) the ability to use these to wrap and unwrap physical artefacts with layers of digital media.

- **Gift Experience:** that enables the generalised making, exchange and subsequent experience of personalised tours for many different museums.
- **Emotion Mapper:** a new tool that was added in response the feedback from the first project review about the need to explore emotional interactions with museum experiences and subsequent explorations of this in WP3. The tool provides a web interface for configuring mobile devices to capture visitors' emotional responses through combinations of (i) text feedback; (ii) self-assessment on well-known psychological scales of emotional response; and (iii) capture of video data that might be subsequently analysed to automatically extract emotional response. The tool also enables the generation of emotion maps to summarise this data per exhibit, per visitor or for each combination of both.
- **The One Minute Experience:** a tool that enables curators and non-professional writers to write interpretive museum labels that are engaging and easy to read. The One Minute Experience consists of two parts: a mobile app that visitors can use to read about the artworks on display and a back-end authoring tool that provides mechanisms and guidelines on how to write engaging, story-based labels.
- **Visitors' Album** – a web application that enables visitors to share their thoughts and emotions about exhibits with each other, anonymously. Using their smartphones, visitors are able to type their thoughts about specific exhibits into the web application, which then shares with them what past visitors have written about those exhibits.

These new tools don't precisely conform to the previous 'design – implementation – evaluation' distinction that proved to be somewhat simplistic. Cardographer and Emotion Mapper, for example, both use visualisation for evaluative purposes. Scannerbox is aimed more at museum professionals while Gift-Wrapper and Tour-Maker are aimed more directly at visitors themselves. Consequently, we have adopted a colouring scheme that suggests the broadly different styles and target audiences of the different tools in the Toolbox.

The overall structure of the underlying platform remains broadly the same (Schema, API and CMS), although the details have been refined as described below.

Given this high-level overview, we now proceed to step through each of the tools and platform components, briefly summarising the practice-based work that has informed it as well as the final functionality that each tool will support. However, we do expect the details of the tools to further to evolve to some degree as we continue to work in an iterative way and learn from the practice of working with other workpackages and partners to deploy them the field.

3. Cardographer

Cardographer is a new tool to support what we are calling ‘intelligent ideation’, by which we mean a data-driven approach to the use of ideation cards for designing new museum experiences.

Physical design cards such as ideation cards, method cards, envisioning cards and variants of these have emerged as a popular means of supporting the early stages of design across many domains. Previous academic studies have revealed how despite – or perhaps due to – their lack of digital functionality such cards are felt to be inspiring, flexible, informative, focusing and collaborative.

Over several years The University of Nottingham team has used a deck of ‘Mixed Reality Game’ ideation cards to teach university students about mixed reality game design. This led to the realisation that the cards might also enable us to capture valuable data about the design process that could support reflection by various stakeholders including designers, design facilitators and also card designers. Specifically, by tagging the designs that emerge from the use of the cards with the particular cards that informed them, we could build up a repository of designs and associated metadata that would help us reflect on how the cards were used, answering questions such as: Which cards are popular? Which tend to co-occur? Which are hardly used? Are there groups of designs that share common cards and others that use only distinct cards? Put more formally, we suspected that a data-driven approach for reflecting on the use of physical design cards might help people better understand the relationship between what has been referred to as ‘Concept Space’ – the range of concepts available to designers (our students in this case) as embodied by the cards – and ‘Configuration Space’ – the range of designs that they help produce. This might then enable us to better appreciate how designers think (for example are they fixated?), how facilitators (e.g. teachers) support them, and how the cards themselves might be extended and augmented.

We therefore prototyped a tool to enable us to capture such a design repository and visualise its concept and configuration spaces. Next, we used this to elicit reflections from the students and teacher on our course as well as from the original designer of the cards we used. Our findings – as reported in detail in a paper at the ACM Computer Human Interaction (CHI 2019) conference (acknowledging the support of the GIFT project) [5] – led us to better understand how usage data captured from ideation cards can extend their utility throughout the design process and how they might be enhanced and digitally augmented in various ways. The implications of having access to such a wide-ranging and long-term view of the design space was investigated by employing he cards in an education context, where post-graduate students were taught the use of the cards and tasked as designers with producing several designs which were later evaluated. These visualisations were made available to the student designers who used the cards, the teachers who guided the usage of the cards prior to the design activities, and to the designers of the card deck itself. Their shared feedback showed how perusing the visualisations gave them insights into dominant trends in the design space, helped them identify elements such as: design concepts prevalent in ‘successful’ designs; underrepresented concepts; potential issues such as commonly occurring conflicts and design fixations and others. In practice the shared knowledgebase gave them an overview of a complex design space through time and usage, helping them to anticipate issues and identify opportunities.

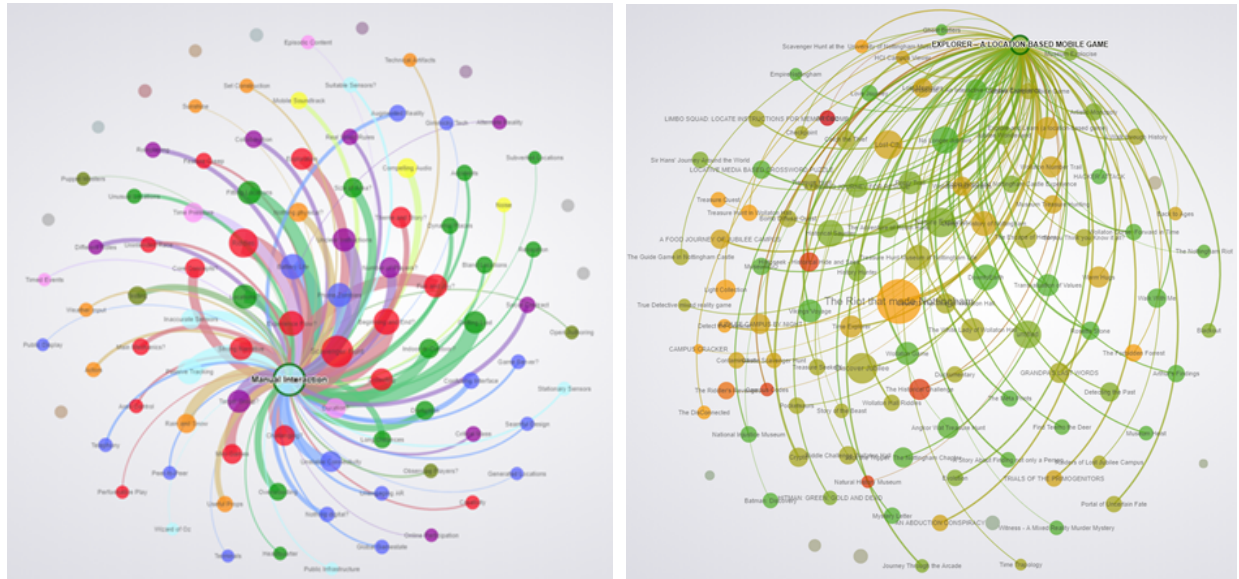


Figure 4. (Left) Visualising Concept Space as the popularity and co-occurrences of Mixed Reality Game ideation cards. (Right) Visualising Configuration Space as the relatedness of designs, number of cards they used and their scores {Images from the ACM CHI paper

In parallel, we had begun to develop a deck of Museum Ideation Cards (supported by funding from the UK's Arts and Humanities Research Council). We introduced our initial deck into the GIFT project and it proved to be popular with the project partners, including the ARM partners who used it in workshops and fed back into the contents and design of the cards as the deck evolved. 'Played' over 5 consecutive phases of an extensive design process, the VisitorBox card deck aims to bring together all the perspectives of a museum, aligning their oftentimes disparate objectives, and helping them design approaches and solutions that are effective and appropriate to their nature, goals and resources. The end result of each session is a defined design artefact, in the form of a poster based on a defined template, which helps articulate the concepts and output through a spatialised arrangement that also facilitates its digital capture in the repository and results in a richer data footprint for later analysis.

The Visitor Box cards were used by ARM partner Culture24 as part of their 'Let's Get Real 6' action research project with UK museums [14] receiving positive feedback from several cultural organisations, with one – Chester Zoo - having continued to use them independently: "We've found the Visitor Box cards a really useful resource for our own projects and they've been used a few times in meetings since". ARM partner the Munch Museum has also independently used the cards.

Like the Mixed Reality Game deck, the VisitorBox cards have been made trackable and therefore designs made with them can be incorporated into a global, or private per-organisation database of designs. This will allow GLAM sector organisations (Galleries, Libraries, Archives and Museums), to benefit in the same way that the Mixed Reality game designers have from the pooling of the domain knowledge.



Figure 5. The Visitor Box museum design cards

Bringing together these two threads of research – research explorations of data-driven ideation and the new deck of museum ideation cards – led us to the following design of the Cardographer tool. In essence, Cardographer facilitates the digital capture of physical museum design documentation into a repository of designs with a common design language whose contents can be analysed. Through dynamic visualisations of the repository’s contents, the platform helps identify how different stakeholders in the museum design process are using the cards and hence engaging with the underlying concepts that they represent. The Cardographer tool employs Augmented Reality to: (i) rapidly identify the cards used throughout an ideation process; (ii) capture the final set of cards that made it into a design; and (iii) overlay dynamic design information (including data about card usage) onto the physical cards to help designers better understand how to use them.

Summary of Cardographer design

In summary, Cardographer’s core functionality will include:

- Aiding Ideation Design activities through Augmented Reality feedback overlays
 - Enabling the 'digital capture' of the physical card-based design artefacts into a repository of designs
 - Detailed interactive visualisations of the repository contents which aid users in uncovering patterns of use in the card concepts and the evolution of the designs which enables the identification of trends, issues and opportunities.
-

4. Scannerbox

Scannerbox is a self-contained photogrammetry-based 3D scanning workflow which enables users to create 3D models of physical objects and environments. The workflow encompasses the entire process of scanning (photographing) objects, processing the images into usable models, and meaningfully disseminating through popular mediums such as social media and more immersive interaction mediums, such as mixed reality experiences with virtual and augmented reality.

The technique focuses on low cost, portability and speed as it emphasises use in live public engagements where speed is of the essence. The workflow enumerates the required skillsets, including photography, photogrammetry and 3D modelling, providing case studies, showcase and detailed guidelines for several contexts, thus disambiguating the normally technically intense techniques for non-technical personnel and demonstrating how the process is both accessible and achievable with consumer level skills and equipment without compromising on output quality. Non-brand specific equipment and software summaries are provided for task and budget suitability, with each item being of general use beyond the general scanning, and the dissemination avenues are not reliant on continued technical maintenance. A summary of impactful public engagements utilising aspects of Scannerbox has been published in [6].

The previously introduced 3D scanning workflow was further refined and employed in several deployments, including work with project partners and with other Galleries, Archives, Libraries and Museum (GLAM) organizations, creative industry partners and well-being projects.

A major deployment was in collaboration with NextGame, who over the summer of 2018 used the scanner at the National Museum in Belgrade for the “Your Stories” project. During the period of the project visitors to the museum were invited to bring with them particularly meaningful objects and have them 3D scanned while they shared their story. Several dozens of objects were contributed and scanned, with an eventual 46 high quality 3D models being produced and made available through a public channel, available at <https://sketchfab.com/NationalMuseumOfSerbia>.



Figure 6. Captured models from Scannerbox at the Serbian National Museum

Another use of the scanning workflow was in Collaboration with Nottingham-based company CityArts who were developing Armchair Gallery (<http://city-arts.org.uk/armchair-gallery/>) a mobile app-based initiative to bring GLAM experiences to patients with dementia in care homes and dementia support groups. Partner organisations included Chatsworth House, Yorkshire Sculpture Park, The Lowry, Dulwich Picture Gallery, Pitt Rivers Museum, Mr Straw’s House & Newstead Abbey. A main objective of the Armchair Gallery was to convey the experience of visiting these venues and exploring their artefacts and collections through interactions. The 3D scanning workflow was employed to 3D scan the statue of the Veiled Vestal, a centrepiece of the Chatsworth House collection (<https://www.chatsworth.org/art-archives/devonshire-collection/sculpture/a-veiled-vestal->

[virgin/](#)). The resulting high-fidelity 3D was incorporated into the app as an interactive visualisation that the users could explore in detail.



Figure 7. Scanning the Veiled Vestal at Chatsworth House

The developed 3D scanning workflow has also been adopted by research departments and groups in other domains. The dissemination has been through focused workshops which introduce the researchers to the tools and techniques of the workflow and furnish them with the necessary skills. The uptake of the workflow was quite successful with low barriers to entry for technical skills and knowledge. More pertinently this wider dissemination allowed the workflow to be introduced to a wider selection of practicing communities who collaborated with the research groups in question. In one case, the Digital Humanities Centre have adopted the workflow and are working with to create 3D scans of her stage costumes for mixed reality performances.



Figure 8. Producing a 3D-printed tangible prop from a scanned model

In addition, the 3D scanning workflow was extended to include guidelines and techniques to convert the 3D models from the scans into optimised 3D printable models. This completes the circle by allowing users to 3D scan a physical object into a 3D model and then 3D print it for multiplication or to incorporate any changes in form, scale and other enhancements. This has the potential to enable operators to mass-produce facsimiles, enhanced or not, of a 3D scanned object. Scenarios of use include producing physical copies of ephemeral or lost objects and producing personalised versions of originals as souvenirs, and other creative uses. Another possibility is to support *passive-haptics* in which 3D models in virtual reality appeared to be overlaid on a tangible physical prop that is held in the hand or otherwise touched, as a relatively simple approach to adding sensations of touch and

weight to virtual reality simulations. One such working example involves rescaling 3D scanned objects into handheld sizes, while also incorporated tracking technology to facilitate mixed reality interactive experiences. Ingoing work in GIFT is exploring how Scannerbox can connect to 3D printing processes to create passive-haptic props to be used as part of extended VR museum experiences.

Finally, as the 3D scanning workflow was intended to be a self-contained tool, deployable by individual organisations, but has expanded in scope and capabilities, work has gone into refining its usability and broaden its appeal. As described in further on, the workflow has been renamed to be “Scannerbox” and its many applications are communicated to the potential users via infographic-like flowcharts which assist in tailoring its deployment to the venue.

Summary of **Scannerbox** design

In summary, Scannerbox will be a tool and encompassing workflow that:

- Enables low cost rapid 3D scanning of physical objects and environments
 - Emphasises live visitor participation events by employing a faster scanning process
 - Facilitates dissemination of the scanned content through social media and mixed reality techniques including AR, VR and novel passive haptic experiences
-

5. Gift Wrapper

The Gift Wrapper is a general tool that enables visitors to digitally wrap and unwrap physical artefacts using a variety of tagging technologies. Rather than using traditional wrapping paper to wrap a physical gift object, the givers of gifts can instead wrap (and unwrap) them in personal messages such as video greetings, selected music tracks or other digital media, potentially even including virtual worlds (as would the case with the kinds of ‘passive haptic’ experiences we were discussing above). In turn, receivers play back the messages, music or other media as they digitally ‘unwrap’ the gift on receiving it. Museums might then use this tool to enable visitors to create personal cards, souvenirs or other gift items as part of their visit. In cases where visitors are able to directly handle museum exhibits, they might then wrap these as gifts for others.

This tool emerged from our ongoing use and development of the Artcodes tool in WP3 and with several external partners as previously reported in D6.1 and D3.1 and then continued over this recent stage of the project. To briefly recap, Artcodes is a publicly available tool that enables visitors to (i) design their own aesthetic and scannable visual markers and (ii) associate these with their own layers of digital content that they can then share with others. Gift has previously used Artcodes to create interactive museum labels in the Museum of Yugoslav History and for an exhibition at Tate Modern. Recent work since then has explored further applications of Artcodes with further external partners (both of whom have approached us) as we now discuss.

Layered interpretations using Artcodes

Several practice-led engagements led us to further explore the ways in which Artcodes (and potentially other similar technologies that connect physical artefacts to digital media) could enable the layering of interpretations.

We were approached and engaged by the Teenagers and Young Adults (TYA) Unit at the **Royal Marsden Hospital** in London to support a creative process that resulted in bespoke Artcodes being designed based on a brief agreed and set by the teenagers and young adults alongside some digital content written and directed by those participating in the project. This interactive piece of work was aimed around giving a voice and relieving some of the stress that surrounds the hospital environment. After speaking with the TYA and running design workshops it became evident they believed in sharing their stories and breaking the silence and awkwardness around cancer in TYA. This led to a modification and adaptation in the Artcode designs, placing greater emphasis on a more illustrative style as a way to tell a personal story. The written accounts contained such personal details and reflections it became clear that they also needed to be communicated more specifically through the Artcodes. The TYA were keen to make use of more literal imagery of cancer cells, putting their stories out in the open, and eager to include colour schemes attributed to their specific cancer to personalise the illustrations further. We commissioned an Artcodes designer to work alongside the TYA in creating the Artcodes for this project based on the decisions above.

We were also approached by the **Nenescape** project, a UK Heritage Lottery Funded project that is working to regenerate a section of the river Nene in England, including engaging visitors with its extensive industrial Heritage. Using a smartphone, visitors and commuters will be able to unlock the hidden histories of the area of Rushden on the Nene and its people. New artworks created by local artist Michelle Barnett based on the old railway line that once ran along your walk will adorn the Greenway walk to allow visitors to explore this heritage. These will include Artcodes to make them interactive and UoN is enabling the team to create a bespoke app so that the public can interact with them. The initial digital layer of content of the app is based on a local news story from 1911.

"Rushden Echo, 15th September 1911 transcribed by Peter Brown.
Rushden Mail-Bag Accident Cut Up on the Railway - Porter's Narrow Escape
The mail bag from Rushden to Leicester was cut up on Tuesday night by a passing train at the Midland Railway Station, Wellingborough
The porter, who was conveying it across the line with other luggage on a truck, did not notice that an express goods train was due to pass through the station until the last moment. He then hurried forward to escape it, and in doing so the mail-bag was jolted from the truck on to the line.
The train went over it and mutilated several of the letters. All the contents of the bag were recovered. The Post Office officials managed where necessary to put the letters together, and they will be delivered in due course."

Visitors are asked to help piece together and find parts of the mail bag by locating the artwork produced by Barnett. Holding your phone up to the artwork will unlock different hidden pieces of local history that may otherwise have been forgotten. Once visitors have completed their journey a reward at the end for their help is offered by some form of discount at a local shop or outlet in the town centre. The Artcodes are placed outdoors and take the form of rugged metal signs that fit in with the surroundings and reflect the industrial history of the river. They are semi-permanent in the sense that the local council can move them to different locations to keep interest up, or even expand the route beyond the Greenway. The project will also work with local community groups to enable them to layer their own digital stories on top of the signs, adding further stories and activities to the initial 'Mail Bag Story'.



Figure 9. Testing prototype Artcode signs in the Nenescape project

Our third practical exploration that has informed the Gift Wrapper tool was to make and deploy an interactive **Advent Calendar**, the design and study of which was reported in a full technical paper at ACM chi 2018 (acknowledging the GIFT project) [12]. Physically, this took the form of the cardboard product shown below. An introduction and instructions were provided on the outside of two cardboard flaps (with links to a website for further instructions), which opened out to reveal a Christmas scene that spread over two A3 pages. The calendar came with 24 Artcode stickers that could be placed under its 24 doors. The idea behind using stickers was to offer a simple entry-level step to customization while also allowing the calendar to be assembled at a time of its owner's choosing: perhaps in one or more sessions prior to the Advent season, or a day at a time during the 24 days leading up to Christmas, or some combination. The calendar came with a bespoke app, available via Google Play and App Store, for scanning the stickers. By default, this took the user to a series of Christmas themed and freely available webpages that we curated from the Internet including: links to Christmas songs, animations, classic movie clips, jokes, games, puzzles and suggestions for seasonal cooking and crafting activities. Scanning a sticker also revealed an option to customize its content by providing a URL or uploading a photo from the phone. The resulting

customizations were stored in a local version of the calendar (a layer of links to content) called ‘My Calendar’. This layer could be shared with other people as a link embedded into email, text and social media. Incoming calendar layers from other people were added to a local list of available calendars and could be re-shared with others. In this way, calendar owners could customize its digital content and share it with others. We also provided a web-based editor for creating and sharing layers. We deployed the calendar to over 200 users through a series of workshops, a mail shot, local craft shops and selling online in Etsy. Interviews with users and analysis of data logs from the app revealed how they had engaged in a wide variety of both physical and digital customizations of the product and especially how calendar owners have gifted layers of personalised content to each other. This lead us propose the generalized notion of customisation maps for hybrid (physical-digital) products as reported in the CHI paper while also inspiring the thought that we might extend the Artcodes app to explicitly support digital wrapping and unwrapping as a particular form of layering content.



Figure 10. The Advent Calendar prototype

From layers to wrappings

The idea that visitors (as well as museum curators) might use a technologies like Artcodes to overlay multiple layers of digital stories and other ‘interpretations’ on top of physical artefacts combined with the explicit use of gift exchange as a mechanism in WP2 (see below) inspired the idea of ‘digital gift wrap’- that we could more directly enable visitors to wrap and unwrap artefacts in digital stories that would then act as a kind of equivalent of wrapping paper.

The proposed new Gift Wrapper tool extends this approach to include the steps of wrapping and unwrapping as key stages in the process of exchanging a gift. It also broadens out the range of technologies that can be used to attach the digital wrapping to the physical artefact.

More generally, the tool enables givers and receivers to become active co-creators of content. This involves addressing two general research challenges:

- Exploring how can we customize and combine physical things with digital content to create an enhanced personalized gift;
- How can we effectively engage a series of stakeholders through the different stages of the gifting process for hybrid artefacts.

The Gift Wrapper tool has been designed to allow consumers to explore combining physical products with digital media to produce novel forms of hybrid gifts to enhance the overall experience of ‘giving’ and ‘receiving gifts, and to support emerging gifting practices. The first prototype tool takes the form of a freely available app on both Google Play and the Apple App Store that enables givers to attach photos, text and URL links to a physical product through a choice of tagging technologies including NFC, QR codes and Artcodes. Receivers can then use the app to open the digital layer of their gift (and can add further additional media if they wish to).

In practice the app links content such as text, audio and video with the physical object though triggers such as Artcodes, NFC tags and QR Codes. These are placed on the physical object and it’s wrapping by the gift-giver. There is no particular upper limit on the number or combination of trigger enhancements, a gift-giver can enhance a gift with as many Artcodes or NFC tags as they want. The initial prototype was used to create a series of personalised an interactive Christmas gift cards and labels at a workshop in Nottingham in December 2018, the results of which further shaped its design.

Summary of Gift Wrapper design

In summary, The Gift Wrapper tool will support the following functionality:

- Enabling givers to transform physical artefacts into gifts by wrapping them in layers of personal digital media
 - Enabling receivers to unwrap these gifts, experience the digital media and being left with the gift item and possibly a reusable residue from the wrapping
- Being able to use multiple technologies to attach the media to the artefacts including Artcodes, QR Codes and NFC tags.

Gift Maker

The Gift Maker app: (i) enables visitors to create personalised museum tours for another by selecting several exhibits from a museum and connecting them together into an overall experience using a series of personal messages and instructions; (ii) send this to a receiver; who can then (iii) experience the tour by following the instructions, visiting the exhibits and finally composing a thank you message. We provide here an overview of the Gift Maker app from WP2 as modified between September 2017 and its public testing in July 2018 to contextualise our discussion of its evolution towards its eventual inclusion in the final beta Toolbox. Full details of the Gift Maker app's functionalities and results of its deployment as of July 2018 can be found in D2.4. In short, the app provides museum visitors with an audio-based experience of choosing and contextualizing museum objects into a personalized gift for a specific receiver, and for those who have received such a gift to experience it as the giver intended.

The iteration of the Gift Maker app created and tested on a small scale in July of 2017 provided a number of indications to Blast Theory how they might move forward to enhance the museum visitor's sense of connection both to their gift giver or receiver and to the museum collection. Blast Theory maintained the same basic concept and structure of the 2017 version of the app – choose a recipient, select museum objects to give by taking photos and providing the reasons behind the choices, 'wrap' the gift, and send it to the recipient, who in turn 'unwraps' the gift and discovers each object and its rationale. However, Blast Theory chose a far more ambitious testing plan for 2018: a full public deployment at the Brighton Museum and Art Gallery, the institution that also hosted the 2017 test. In order to create the most coherent offering with the clearest agenda for data gathering and analysis, they focused on the single use case of an individual museum visitor creating a gift for a single receiver, one with whom they had a personal relationship. Likewise, gift receivers would experience their gifts individually.

Blast Theory's key design aims included keeping the app self-contained such that museum staff would not be burdened with supporting the needs of app-using visitors; fostering in each app user a positive intent to create a personally meaningful gift that emphasised the giver-receiver relationship over the museum objects; and basing the interaction around voice rather than screen. These second and third aims were built in large part around a carefully crafted voiceover guiding app users through the gift-giving or gift-receiving experience, using the tone of an 'intimate stranger' very unlike the more neutral approach of a standard audio guide. Using voice as the main input and output mechanism also put app users in the unusual situation of speaking their messages out loud into their phone while in the museum space.

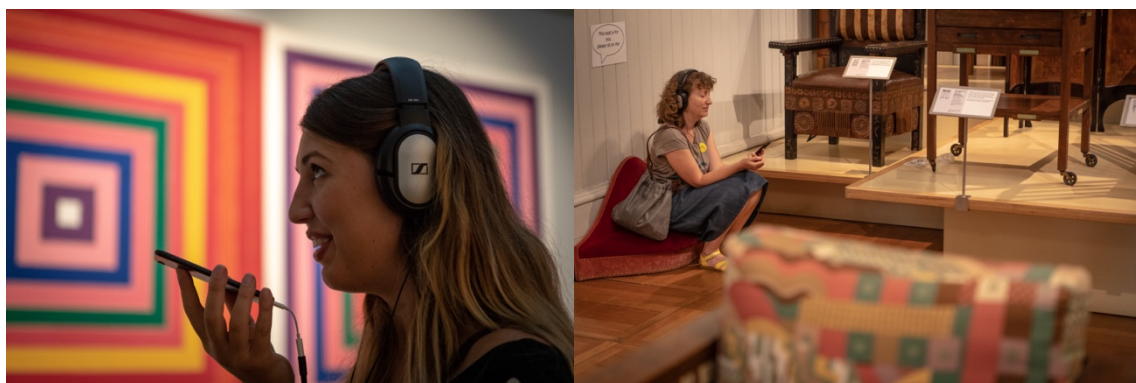


Figure 11. Speaking and listening in the museum space. Photos by Charlie Johnson

Key changes to the app's functionality included:

- imposing an upper limit of three objects per gift but allowing gifts with only one or two objects
- simplifying the visual design
- using on-screen text primarily to support the audio
- developing voiceover to both guide usage and create an emotional tone and intention
- removing the option to select from photographs taken in advance
- removing text-based input for messages, including the responses invited from receivers
- removing conditions for the receiver to meet before being allowed to experience their gifts
- changing the 'wrapping' process from an additional layer of text to making a free selection of a song to accompany and contextualise the gift

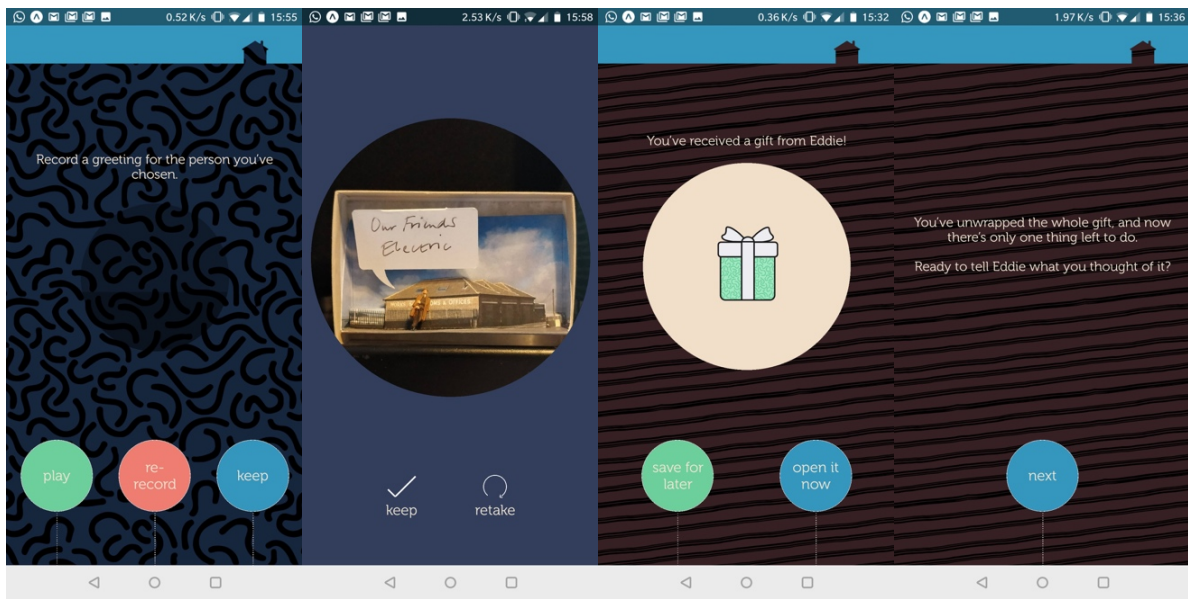


Figure 12. Recording a message and taking a photo (giver); receiving a gift and recording a response (receiver)

The deployment took place on 18, 19, and 21 July 2018 and was open to members of the public. 114 people took part and provided feedback; a further 56 used the app without providing feedback. This represents an uptake of 21.4% of the entire visitor population over the three days of the deployment. Due to technical limitations, the app was made available only for a certain type of smartphone. Therefore, Blast Theory staff arranged for the loan and return of smartphones and headphones that they themselves provided. They also maximised take-up by actively inviting museum visitors to take part, in addition to setting out promotional materials at the museum's front desk. In this sense, the app was not entirely self-contained, though devising a way to overcome this hurdle is one of Blast Theory's aims for developing the generic version of the app intended for the Toolbox. Based on the responses of app users, Blast Theory's aims of generating the intent to give a personally meaningful gift – or to receive one in that spirit – based on voice was fascinatingly productive in terms of the range of reactions received. Overall, it seems to have succeeded for many more people than it disappointed, with the dominant finding being the tendency to experience their entire museum visit 'with new eyes'. A full discussion of the findings from this deployment and their meaning for the design community can be found in [13].



Figure 13. Demonstrating and using app with its simplified visual design. Photos by Charlie Johnson

Summary of the Gift Maker app design

In summary, the final design will include all of the existing functionality, with modifications to:

- enhance scalability
 - adapt to a variety of types of museum
 - minimise its reliance on human intervention and support.
-

7. Emotion Mapper

The Emotion Mapper is a new tool in the GIFT Toolbox that provides artists/curators with the ability to collect and view data based on user emotions in response to particular exhibits in the displayed collection. The idea is to be able to construct ‘emotion maps’ of responses, either per visitor, per exhibit or for combinations of both, that invite visitors to reflect on and discuss emotional responses. Its underlying philosophy is therefore that emotional response is something to be discussed and reflected on by visitors as a useful way of helping them interpret a museum experience rather than something that can simply be measured and collected. Conversely, museums provide a useful lens for engaging humans in discussions of the meaning and representation of emotion that could feed into new ways of capturing it in the future, perhaps in other contexts.

The idea for the tool arose in response to the first formal project review that encouraged exploration of emotionally-driven interactions while the present design emerged from experience of staging and capturing and analysing data about emotional interactions at the Munch Museum in Norway, carried out (and reported in detail elsewhere) under WP3.

Using this tool, designers/curators become administrators or ‘admin users’ with control of the tool, how the data is collected and visualised, and what the visitors will be able to see regarding their data. The Emotion Mapping Tool functions as a modular questionnaire, where the admin users can set up different data capture modules for each exhibit in the collection. It allows admin users to pick and choose from various pre-set modules, which are a set of data gathering methods that range from simple questions about the exhibit to capturing physical visitor data such as video of facial expression. These modules can also be edited and tweaked to fit the exhibit, such as changing the types of questions that are asked.

Visitors that are using the tool (e.g., on a mobile device) will then be prompted at exhibits they are viewing or gifting to complete the modules that have been specified for the specific exhibit. Once the visitors have finished viewing the collection or gifting, the data that has been gathered can then be used by the admin users to create ‘emotion maps’ – data visualisations using various visualisation tools.

Background research

Background research began with a series of experiments at the Munch Museum to determine (i) to what extent visitors might visibly emote (display their emotions) in front of paintings and (ii) whether state of the art video analysis techniques (from the H2020 ARIA-VALUSPA project) can detect this. Our partner Nextgame designed a series of audio-driven performative stories designed to elicit reactions from visitors and a corpus of videos was captured.

The videos that were obtained from the Munch museum were analysed, first for Emotion data, and then for the movements of key Facial Action Units. The emotion data was obtained by running the various videos of visitors faces through ARIA’s emotion detector. The detector went through each given video frame by frame and classified what emotion the face was displaying in that current frame. There were seven emotions that the detector classified: Neutral, Anger, Disgust, Fear, Happiness, Sadness, and Surprise. After each frame was classified, the overall percentages of each emotion per video were calculated.

Facial Action Unit analysis was then conducted on the video dataset. The Facial Action Units describe the movement of specific facial muscles due to facial expressions. Overall there are 20 different action units to describe different facial muscle actions. The Facial Action Unit data was

obtained in a similar manner to the emotion data. The BlueMax action unit detector was used for detecting the various Facial Action Units. At the time, BlueMax coded five action units: Cheek raiser, Upper lip raise, Smile, Dimpler, Chin raiser, which limited the overall results of the analysis. The different Facial Action Unit values were compared between all the visitors, at each exhibit, along with analysing how their facial actions changed over the course of the recorded videos.

While the results showed some promise for being able to detect aspects of emotional response, the overall feeling from the tests was that the project needed a more nuanced view of why we might be capturing emotional response along with more comprehensive and reliable ways of so doing. This inspired the approach to capture a richer dataset from visitors – self-report as text and on established emotion scales from the literature as well as video – and also to reflect it back to visitors as visualisation that would open up rather than closing down discussions of the nature and meaning of emotion in response to artworks and other exhibits as part of a visiting experience.

Design

The Emotion Mapping Tool consists of three components:

User Interface (UI):

The UI (Figure 14) will be the interface that visitors will see when they interact with the Emotion Mapping Tool. They will have the tool prompt them to answer different questions which are set up by the Admin Dashboard. Visitors will be provided with some form ID or a reference, so that they will be able to access their data at a later point if necessary. The visitors will also be able to view their data as they are viewing the collection, in which they will be able to view their own gathered data after each exhibit, see all exhibit data combined, or view how their data looks compared to other visitors taking part.

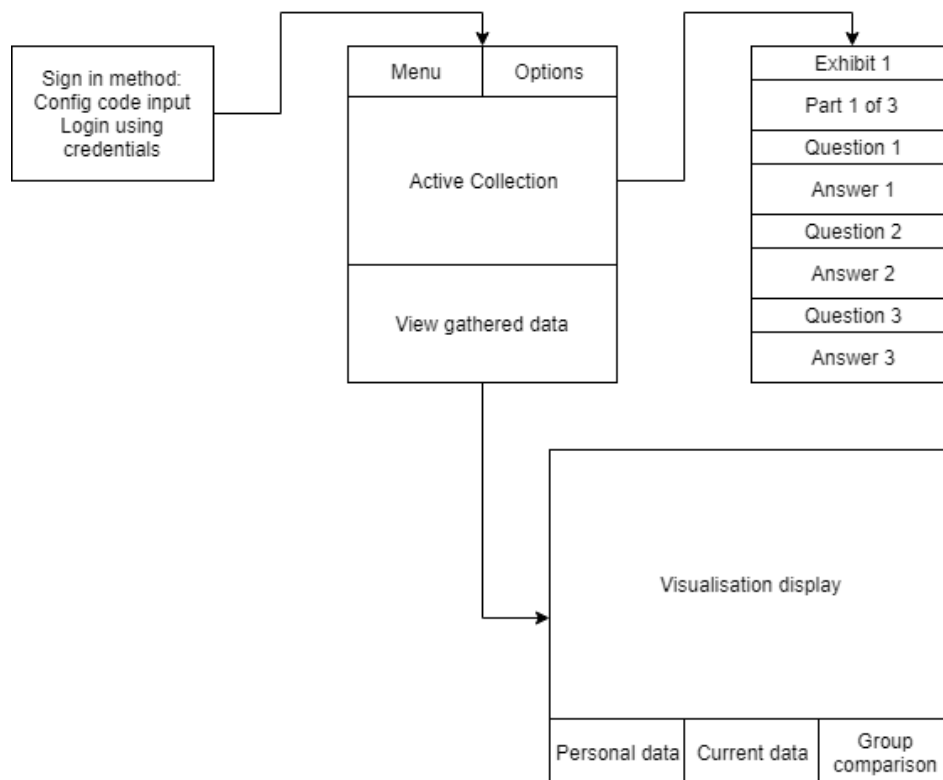


Figure 14. Emotion Mapper User Interface wireframe

It should be possible to provide account-based authentication for the UI, allowing visitors to return and view past collections they visited and what data was gathered from them. An alternative to account-based authentication could be that visitors provide some form of reference code, which they can then use to view their gathered data at a later date. Visitors will also be able to view any data that has been gathered during their viewing of the collection on the menu of the user interface.

Admin Dashboard:

Inside the Admin Dashboard (Figure 15), admin users will be able to create module configurations for collections in order to gather data from the visitors. They can choose to either set modules for the whole collection, where each exhibit will have the same activated modules, or set modules per exhibit. The Admin Dashboard would also be able to decide what type of visualisations the visitors will see if they view the gathered data for the collection.

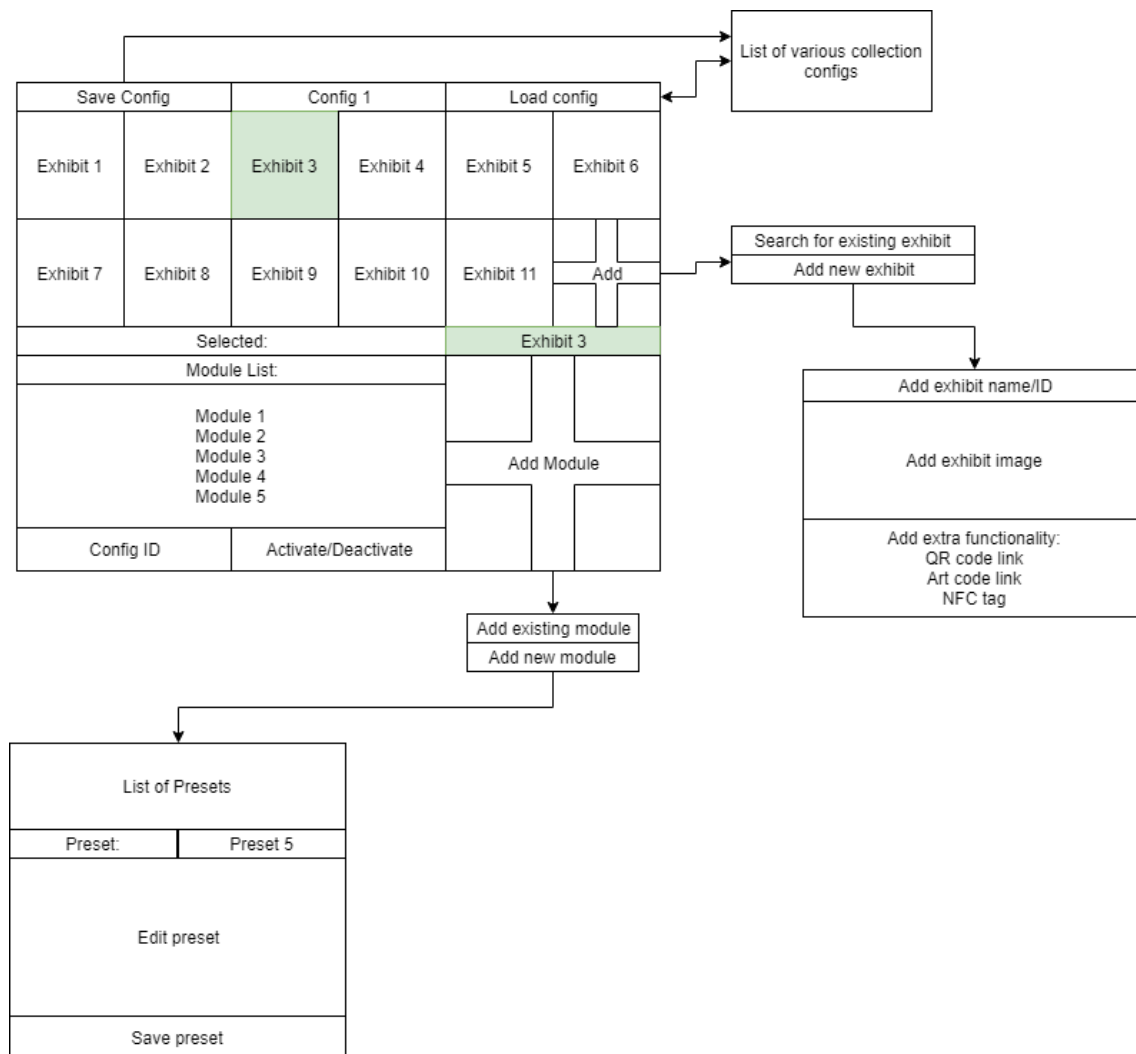



Figure 15. Emotion Mapper Admin Dashboard wireframe

Modules:

Modules (Figure 16) are the different customisable parts of the questionnaire. These modules are created from loading up various pre-sets provided to the admin users, which they can then customise in order to tailor them to the current collect/exhibit. The modules that are created by the admin users can then be saved and loaded at later opportunities, like when creating a configuration for another collection.

Module 1
Question 1
Example answer 1
Question 2
Example answer 2
Question 3
Example answer 3

Module 2


Module 3
Slider 1
Slider 2
Slider 3

Figure 16. Emotion Mapper Example module mock-ups

Data

The data obtained from the UI component will be stored when a user completes the modules associated with the exhibit inside the collection. Admin users can then take the raw data that is stored inside the data base and export it to be used with various third-party data visualisation tools.

The Emotion Mapping Tool modules will support three types of emotion data collection: Text, Scales, and Physical, potentially alongside more general demographic data.

- Text data that is gathered can be as simple as asking visitors for a word to describe what the exhibit makes them feel, to providing the visitor with a scenario and asking them how they would react in that situation.
- Emotion scales can be used in order to get visitors to self-report their emotions, from using sliders to allow visitors to select how much of an emotion they are feeling, to simple buttons which correspond to different emotions.
- Physical data will mostly consist of getting video data of the visitors face as they view exhibits. There are possibilities of using other peripherals to gather physical data, such as the Google Fitbit for gathering data on heart rate.

Summary of the Emotion Mapper tool design

In summary, The Emotion Mapper tool will provide the following core functions:

- Web-based edited to configure what data about emotional response is captured from visitors using which prompts.
 - Mobile interface that delivers these prompts to visitors and captures the data.
 - Support for text data, ratings using recognised emotion scales and physical data such as video.
 - Support for generating emotion maps that visualise this data in meaningful ways that invite interpretation.
-

8. The One Minute Experience

The One Minute Experience allows visitors to engage with the artworks they see within the museum through a unique presentation of interpretive texts. It consists of two parts:

- A mobile app that allows visitors to scan works of art and read interpretive texts in the form of engaging, bite-sized stories.
- A back-end story-editor tool that allows curators to easily construct and edit interpretive texts, with guidelines on how to create texts that are brief and engaging, and that encourage personal interpretation and reflection.

The motivation of The One Minute Experience comes from research that looks at how visitors spend time reading interpretive texts within museums. Interpretive texts are often long, academic in tone, and require significant effort to read and understand. On average, a visitor would spend two seconds to look at a work of art, and 10 seconds to read its interpretive label. Instead, labels need to offer concrete information that will allow visitors to answer questions about the art and emphasise the connection between the object and its text in order to encourage reading. Such connections can be made by referring to specific details in a work of art, posing rhetorical questions, and adopting storytelling conventions.

The interaction design of The One Minute Experience is based on the idea that labels should be considered as narratives, rather than facts. Although audio is commonly used to present interpretive material on mobile apps, audio often negatively impacts social interaction and inhibits conversation between companions. The intention of this tool is to provide an experience that allows visitors to interpret and reflect on the details on an artwork, while also permitting questions and dialogue between visitors. Hence, a text-based format was adopted, where ‘stories’ about the artwork were divided among six screens of text, with each screen being approximately 160 characters long, or the length of a single SMS. These stories follow a classic Aristotelian storytelling structure, and users can swipe back and forth through each screen. The division of texts into several screens facilitates natural breaks in the reading, allowing visitors to pause and reflect on the details of the artwork, and direct their attention back and forth between the text and the artwork (see Figure 17).



Figure 17. A test participant reads a label from The One Minute Experience in The National Gallery of Denmark

The One Minute Experience also contains an authoring tool (see Figure 18) where curators can write brief interpretive texts. The authoring tool contains a set of guidelines and examples of what to write for each screen and what each screen should aim to accomplish in the mind of the visitor. A specific storytelling format was devised that encourages users to observe the artwork, look for specific details, and promote curiosity.

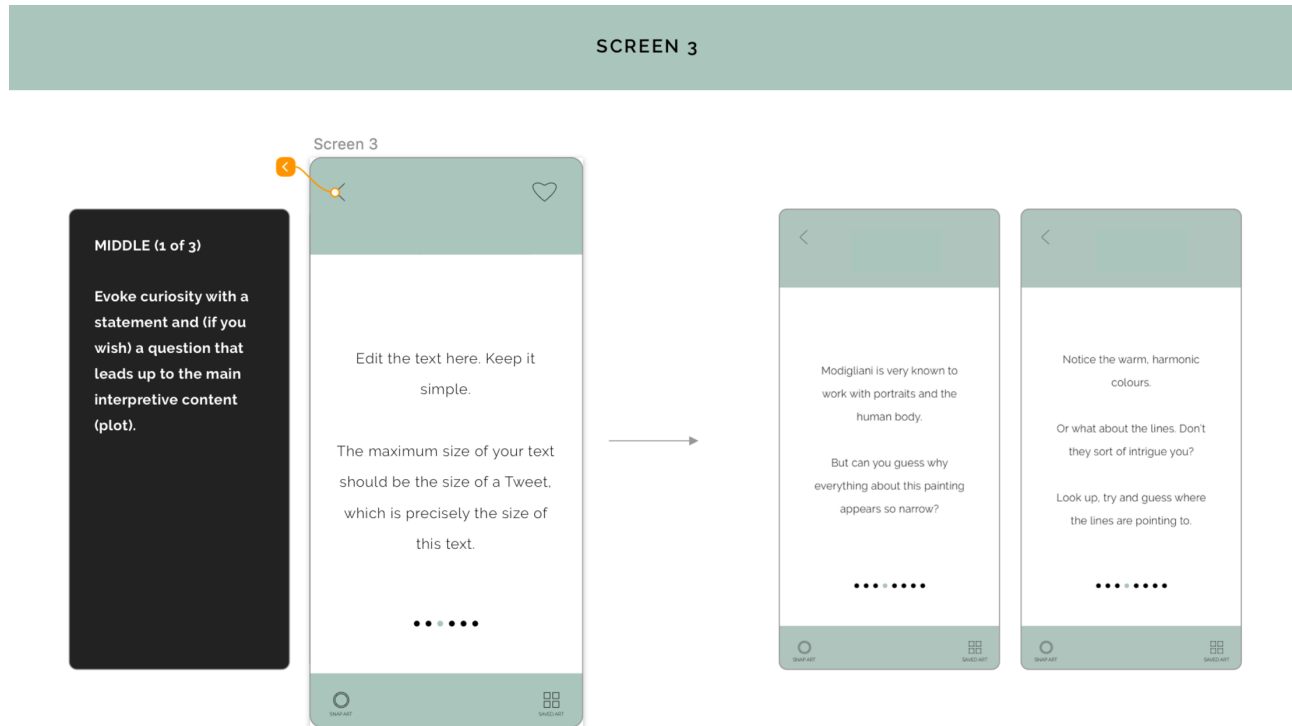


Figure 18. An early version of The One Minute Experience authoring tool

The authoring tool was tested in a series of evaluations that were conducted with museum enthusiasts and a professional art curator. From these evaluations, a number of key insights were drawn based on the effectiveness of this storytelling format and how it could be used to support interpretive texts within museums:

- In assessing how users would respond to different narration styles for interpretive texts, it was revealed that users preferred an informal storytelling style, as long as the text did not signal fictional elements that might cast doubt on the authenticity of the information.
- In assessing the original interpretive texts as supplied by the museum, all users found these original texts overwhelming, and none of the users read them to the end.
- In contrast, the texts that were generated using The One Minute Experience authoring tool were read to the end. Participants reported that these texts were easier to read, due to both their length and the fact that they used less difficult words. The segmented presentation of the texts, along with the fact that they encouraged visitors to look directly at the artworks and asked rhetorical questions, made the reading experience more pleasurable and encouraged more frequent observation of the artworks on display.
- According to a Lix number analysis – a measure that provides a readability score for a text – texts that were written using The One Minute Experience authoring tool were shown to be significantly less difficult to read than the original interpretive texts as provided by the museum.

As of March 2019, The One Minute Experience authoring tool is available in the form of editable Sketch files that can be prototyped, enabling curators to write, re-write, and test their written labels as they would appear in the mobile application. In September 2019, The One Minute Experience will be released as a downloadable app for museum visitors and as a Web-based tool that guides curators and other museum staff through the process of creating and editing interpretive texts according to the storytelling guidelines. Museums can adopt The One Minute Experience by registering with the Web-based authoring tool. Visitors can then download the mobile app that will link to the museum's collection and stories as supplied by the authoring tool.

The design and development of this tool supports existing work on the way visitors interact with interpretive labels, and provides some key insights to do so in a way that increases the visitor's attention to the artwork on display:

- Interpretive texts are considered to be more engaging if they answer the visitor's information needs, pose rhetorical questions, and encourage visitors to look for specific details within the artwork.
- Interpretive texts are easier to read if they are brief, use less complex language, and are divided into several sections.
- Mobile devices allow for such opportunities by placing the text on separate screens which the user can then 'swipe through'. This design raises interesting implications in the way visitors interpret the text, as the design allows for natural pauses that create time for reflection and/or direct attention between the text and the artwork. The design also addresses a longstanding concern of museum professionals that the use of mobile devices to interpret artwork focuses the visitor's attention on the device instead of the artwork. In contrast, the design performs a balancing act, where visitors share their attention between the text, the artwork, and each other.

9. Visitors' Album

Visitors' Album is a playful museum experience that can be adapted to different exhibitions. It consists of a mobile web application, the interface of which is accessed through the visitor's smartphone. The experience enables visitors to:

- anonymously share their personal story or emotion about an exhibit,
- read the personal stories or emotions of other visitors for that exhibit, and
- use those stories and emotions to discover other exhibits that are tagged with the same responses.

The goal of this project was to create a minimalistic playful experience that would maintain visitors' attention to the exhibits and complement the museum experience. Visitors should be able to maintain their focus on the museum exhibits, while at the same time using their smartphones to access the stories and emotions shared by past visitors. Furthermore, to maintain a minimalistic design, the experience was implemented as a mobile Web application. Simply by sharing the correct URL with visitors, they are immediately ready to participate in the experience.



Figure 19. Postcard handed out to visitors in the National Gallery of Denmark

The experience was developed between September 2018 and January 2019, when it was publicly tested in the exhibition space of the National Gallery of Denmark (www.smk.dk). In total, 20 visitors tried the experience, out of which 10 participated in interviews and provided feedback. Visitors were given a postcard (see Figure 19) that contained the URL and a corresponding QR code. Either means of access was all they needed to do in order to begin the experience. Once they entered the URL and began exploring the exhibition, the Web application guided them to locate an exhibit (see Figure 20). After selecting the exhibit, visitors were prompted to reflect on it

and share what came into their minds (see Figure 20). Then, they were presented with what past visitors had shared for that exhibit (see Figure 21). Finally, the experience allowed them to explore exhibits connected with a specific emotion (see Figure 21).

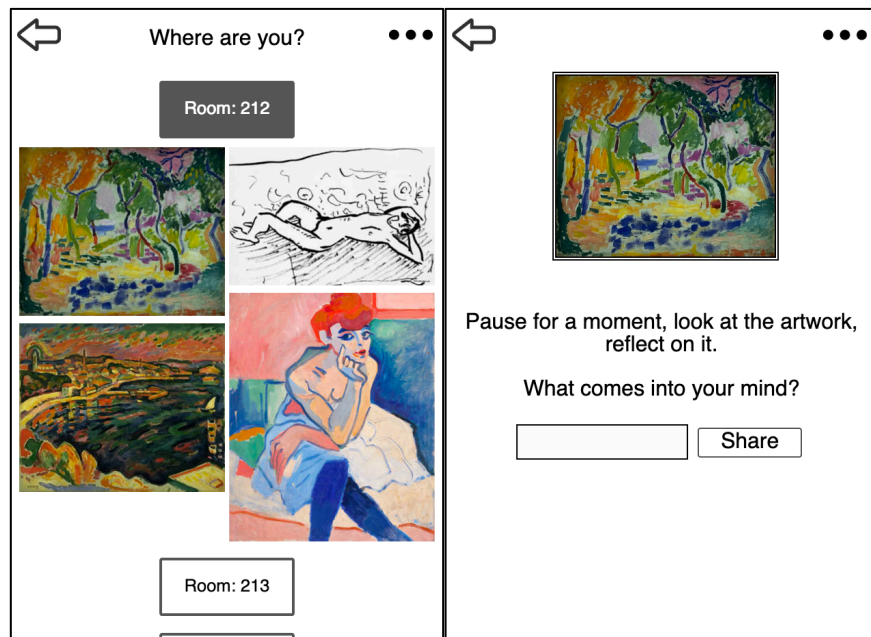


Figure 20. (Left) Locating the exhibit (Right) Sharing their thoughts on that exhibit

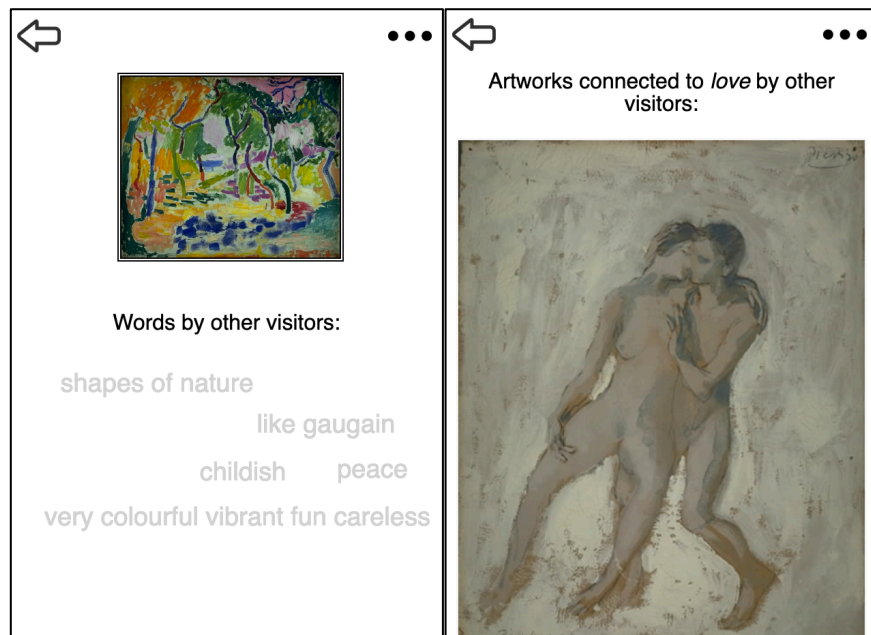


Figure 21. (Left) Other works in the collection connected to a given thought (Right) Thoughts previously shared about that exhibit

During the test, most visitors reacted positively towards the experience. They commented on the fact that it required them to focus more on the artwork that they would otherwise, and thus they were more present during the whole experience. Also, they said that being asked to come up with a word or phrase made them reflect and discover things about the paintings that were not apparent to them at first glance. Moreover, it made the whole experience more personal to them. They also mentioned that they did not find the experience more intrusive than using their phone to take pictures or share them on social media.

The Visitors' Album experience is adaptable to different exhibitions, allowing a range of museums to adopt it with ease. A set of instructions is provided for museum curators, along with a script that configures the Web application for that exhibition. The script requires digital images of exhibits, along with the necessary metadata, in order to set up the environment. These tasks require no 'technical skills' beyond taking and uploading photographs.

The functionality of the Visitors' Album experience consists of:

- Creating a minimalistic, accessible, low-tech experience that supplements the exhibition space rather than occupying the attention of the visitors.
- Providing visitors with the ability to anonymously share with each other their personal stories and emotions, thus, creating a more personal experience.
- Allowing visitors to discover exhibits that have been connected to a specific emotion by past visitors.

10. Platform

The underlying platform which underpins the Toolbox serves several key functions. First it provides a common frame of reference for the outputs of all the tools in the Toolbox by providing a shared defining schema. Second it provides a communication mechanism and channel between the various tools in order for them to communicate information and content through an Application Programming interface (API). And third, it provides a management back-end in the form of a Content Management System (CMS) which enables the storage of the tool outputs and allows administrators to manage and curate the gathered content.

Developers of apps and systems will have the option of incorporating compatibility with the platform to varying degrees. Some can use its entirety, relying on it for management and storage, while others can utilise their own management interface and storage approach, eschewing the CMS, but still share created content with the platform by adhering their content to the schema and using the API for communication.

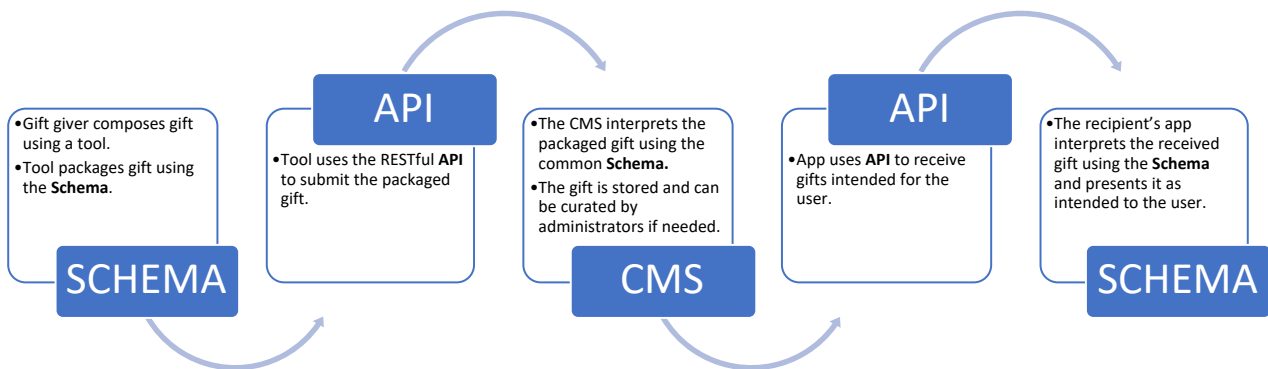


Figure 22. The Gift Platform

The platform is comprised of 3 main elements:

Content Management System

As the central spoke of the underlying platform it is appropriate to begin with an overview the Content Management System. The CMS provides several critical functions, including user listing and authentication, persistent gift storage and curation, and being the host of the API.

The CMS is essentially a customised instance of a WordPress CMS. This introduces several benefits as WordPress is one of the most widely used CMS platforms with which many users are familiar. It reliably incorporates several of the required functionalities and is widely compatible with other systems through well documented sources and an active community. GLAM staff are likely to be already familiar with WordPress Interface and working paradigms.

The GIFT CMS extends WordPress by adding 'Custom Post Types' corresponding to the Gift elements that are described by the schema, such as gift content (payloads), gift opening tasks (wrappings) and gift opening instructions (gift cards).

The CMS is intended as a back-end interface for administrators and curators. They will be able to manage users and review or edit gifts and their content should any issues arise. They will also be able to download the gifting data for analysis. While the CMS will handle their authentication, cloud storage and communication of their gifts, users of the gifting apps will have no cause to use

the CMS – and will not have access to the backend. The individual apps and systems will have appropriate management front ends for their gift making and management purposes.

The GIFT project maintains a reference instance of the platform available at (<https://toolkit.gifting.digital/>) and instructions are provided at (<https://toolkit.gifting.digital/gift-platform/diy-gift/>) detailing several different methods by which private instances can be set up and the reference site replicated. Our implementation is open-source and as a derivative of WordPress, the Platform inherits version 3 of the GNU Public License. This license requires that other developers who alter or extend our reference code must ensure that their new code also inherits the GPLv3 license.

Schema

The schema is a JSON-based definition of a ‘Gift’. In essence it provides a set of properties that every ‘Gift’ object, that is produced by any of the tools in the Toolbox, must adhere to in order to be cross compatible with the other tools and the services provided by the Content Management System. The tools don’t necessarily need to adhere internally to the schema, but they will need to use it at the point of communication with the platform.

Each tool or application which creates some form of gift or GIFT object can use the schema to package the output as a JSON object. For example, this would be any gift making app that allows a user to make a gift and send it to another – the user composes the gift, providing any content they wish, and the app ‘packages’ it up as a JSON object which contains both the gift and any necessary information.

Similarly, any tool, app or system, adherent to the schema, that receives such an object will be able to recognise it as a GIFT object and process it as required, for example by unpacking it and interpreting the familiar JSON schema to rebuild the gift for the recipient.

The current work-in-progress version of the schema contains definitions for the following:

- Logistical Information
 - Author details
 - Recipient details
- Wraps
 - The tasks, or ‘gift wrappings’ that a recipient must undertake in order to get their gift.
 - Can range from simple tasks, such as acknowledging receipt, to more complex or involved tasks such as being at a specific time and place.
- Payloads
 - The actual content of the gift
 - Can be any type of media, such as text, audio, video, 3D content, etc.
- Gift cards
 - Introduction content that is presented to the recipient prior to opening the gift
 - Can be used to provide instructions for more complex unwrapping experiences.

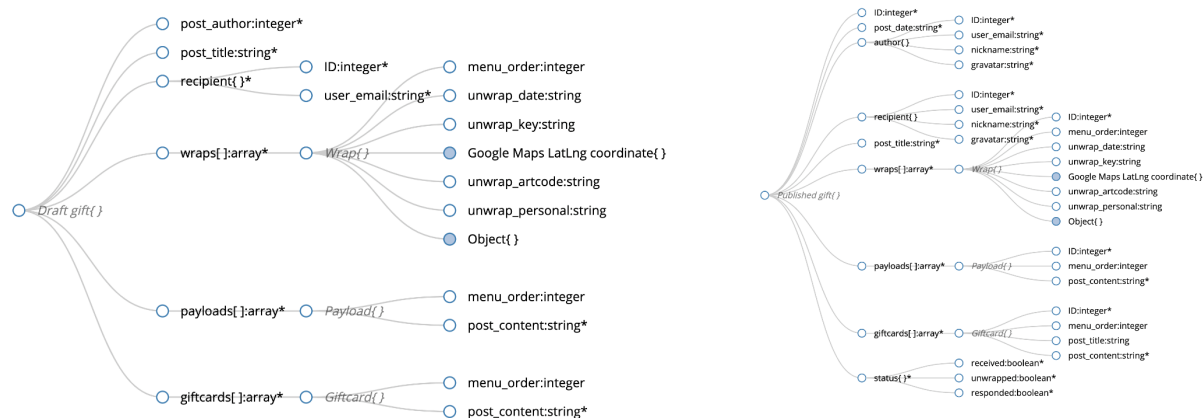


Figure 23. The Gift Schema

As seen above in Figure 23, the schema has two main forms, ‘Draft’ and ‘Published’. The draft schema is the one that gift making systems need to adhere to when making gifts and the published schema is intended for those that have been submitted via the API to the CMS for storage, and eventual publication to their recipient.

While the Toolbox tools, and any other applications, that wish to be compatible with the wider platform must at minimum adhere to the platform schema, it should be noted that it is not exhaustive or restrictive. The schema is designed to formalise the minimum required information that an object would need in order to be recognised by the platform. These include basic information such as a unique ID, timestamps, author ID, etc. However, any system can include additional content in the JSON object that it creates, which could be additional content and media, as well as additional formatting and wrapping directives. For example a gift making app that includes 3D scanning functionality can append the 3D content information to the JSON package. The CMS will store this information and the recipient’s app will be able to interpret the extra content if it has been designed to do so.

The documentation for the schema can be found at <https://toolkit.gifting.digital/gift-platform/schema/>

Application Programming Interface

The Application Programming Interface (API) is a web service that is part of the CMS instance. It provides a set of methods (or functions) which allow Gift apps and services to communicate with the CMS, and through it with each other.

As a part of the CMS, the API too is an extension of the WordPress RESTful API. Modern WordPress-based services implement the WP REST API (see <http://wp-api.org/> for documentation) to encourage a richer ecosystem of websites, apps and services powered by WordPress. All sites implementing this API expose common methods (or "routes") for discovering information about the sites and for retrieving basic WordPress posts. These common methods are not especially useful for gifting apps or services, but the GIFT Platform extends the WP API with a set of custom routes documented at <https://toolkit.gifting.digital/gift-platform/api/>

Primary routes

The primary functions of the GIFT API are to allow clients to publish new gifts and retrieve published gifts addressed to their user. These methods expect clients to adhere to the GIFT Schema, i.e. the API will only accept draft gifts that are correctly structured, and will only publish gifts that are correctly structured.

The process of "sending" a gift from one user to another involves ...

1. The sender's gifting app constructing a JSON data object that conforms to the GIFT Schema for draft gifts
2. The sender's app delivering that draft gift to the "publish" route of the GIFT API
3. The GIFT CMS accepting the draft gift and storing it in the data store
4. The receiver's gifting app using the "retrieve" route of the API
5. The GIFT CMS passing on any published gifts addressed to the receiver
6. The receiver's app representing these gifts to the receiver

Secondary routes

To make more complete gifting experiences possible the GIFT API provides several more methods.

Some of these methods allow clients to add and retrieve records of physical objects in the GIFT CMS, i.e.:

- List all physical objects
- Register a new physical object
- Import digital version s of physical objects where available
- List all object locations

Other methods allow clients to manage gift recipients:

- List potential gift recipients
- Invite a new GIFT user

Finally, a set of methods allow clients to retrieve and update the state of gifts:

- Retrieve gifts sent by a GIFT user
- Indicate that a gift has been received
- Indicate that a gift has been unwrapped
- Publish a response to a gift
- List all gift responses sent to or received by a GIFT user

11. Conclusion

The GIFT Toolbox provides a collection of tools to support various stakeholders in museums in designing, prototyping and evaluating new interactive visitor experiences. The tools can be used independently, but are also linked through a common schema and content management system. The toolbox has evolved in an iterative way through engagement with other workpackages, ARM partners and other external partners, while also being informed by underlying research. This document has presented a snapshot of its design as we enter the final year of the project. At this point, we expect the overall design of the Toolbox to be stable, though the detailed design of each tool – both its functionality and realisation – will further evolve as we continue to work with the other parts of the project in a responsive and iterative way.

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